DOCUMENT RESUME

ED 335 011 IR 015 178

AUTHOR Russell, Floyd K., Jr.
TITLE Receive-Site Facilitator Practices and Student Performance in Satellite-delivered Instruction.
PUB DATE 91
NOTE 20p.; In: Proceedings of Selected Research Presentations at the Annual Convention of the Association for Educational Communications and Technology; see IR 015 132.
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Academic Achievement; *Communications Satellites; *Distance Education; *Evaluation Methods; Factor Analysis; French; Higher Education; Instructional Effectiveness; Models; Predictor Variables; Program Evaluation; Secondary Education; Second Language Learning
IDENTIFIERS *Receive Site Facilitators

ABSTRACT

This study examined the relationship of satellite distance education receive-site facilitator knowledge and practices to student achievement in a satellite distance education course. The specific areas of interest were: (1) facilitator knowledge about the satellite telecommunications delivery system; and (2) facilitator practices for enhancing student interaction with the distance teacher and the course content. Students' semester grades were used as the measure of student achievement for comparison with facilitator knowledge and practices. An unbalanced 2 x 2 factorial design was used to analyze the data. Both independent facilitator variables were assigned to high and low groups around a median. The dependent variable was the site mean for student's final semester grade. Analysis of the study questions did not reveal a significant relationship between student achievement and either of the facilitator variables. A relationship may not exist between facilitator knowledge and practices attributes and student achievement, or the instruments used in this study may have failed to find a relationships. It is possible that a test with different items may find a relationship between facilitator attributes and student achievement. It is also possible that a test alone may not reveal such a relationship, and this may, in fact, be the case here. The data indicated that interacting factors are the best indicators of student achievement across sites. Those facilitators best able to assist students in a variety of situations and resolve both instructional and systems operations problems may be more successful in facilitating student achievement. That type of facilitator would be more likely to fit a model of the facilitator capable of reducing "structure" in a system and increasing "dialoge." (3 tables, 3 figures, 11 references) (BBM)

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

ED335011

Title:

Receive-site Facilitator Practices and Student Performance in Satellite-delivered Instruction

Author:

Floyd K. Russell

IR015178

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Michael R. Simonson

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

BEST COPY AVAILABLE

RECEIVE-SITE FACILITATOR KNOWLEDGE AND PRACTICES AND STUDENT ACHIEVEMENT IN A SATELLITE COURSE FOR HIGH SCHOOL STUDENTS

FLOYD K. RUSSELL, JR.

ABSTRACT

This study examined the relationship of satellite distance education receive-site facilitator knowledge and practices to student achievement in a satellite distance education course. The specific areas of interest were: 1) facilitator knowledge about the satellite telecommunications delivery system, as evidenced by a knowledge test and a self-report performance inventory; and, 2) facilitator practices for enhancing student interaction with the distance teacher and the course content, as measured by a self-report performance inventory of facilitator practices. Students' semester grades were used as the measure of student achievement which was compared to facilitator knowledge and practices.

An unbalanced 2 x 2 factorial design was used to analyze data for the study questions. Both independent facilitator variables, knowledge of the satellite telecommunications delivery system and practices, were assigned to high and low groups around a median. Scores above the median were high scores; scores below the median were low scores. The dependent variable was the site mean for student's final semester grade.

Analysis of the study questions did not reveal a significant relationship between student achievement and either the facilitators' knowledge of the satellite system or practices for facilitating student interaction with the course content and the distance teacher or their interaction.

A relationship may not exist between facilitator knowledge and practices attributes and student achievement. Alternatively, the instruments used with the population in this study may have failed to find a relationship. It is possible that a test with different items may find a relationship between facilitator attributes and student achievement.

It is possible also that a test alone may not reveal a relationship between facilitator attributes and student achievement. This may, in fact, be the case because the data indicated that interacting factors are the best indicators of student achievement across sites. Those facilitators best able to assist students in a variety of situations and resolve problems of both an instructional nature and a system operations nature may be more successful in facilitating student achievement. That type of facilitator would be more likely to fit a model of a facilitator capable of reducing "structure" in a system and increasing "dialog".

RECEIVE-SITE FACILITATOR PRACTICES AND STUDENT PERFORMANCE IN SATELLITE-DELIVERED INSTRUCTION

Introduction

This study examined the relationship of selected attributes of receive-site facilitators for satellite-delivered distance education to student achievement in a distance education course. The specific facilitator attributes of interest were facilitator knowledge of the satellite telecommunications delivery system and facilitator practices for assisting students with satellite-delivered instruction.

While satellite communications technology has proven to be a viable means of providing courses which otherwise might not be offered to secondary education students, the complexity of the enterprise has had an impact on how education is organized and managed. When classes have been taught via satellite by a distance teacher, a classroom facilitator at the receive-site has worked with students to help them interact with the distance teacher and the course content. The facilitator has acted in a support role. The distance teacher has had primary responsibility for student learning.

Despite prior experiences with satellite delivered instruction in the secondary education environment in the United States (Grayson, 1974; Vest, 1975), there is not a large body of research available on the effectiveness or patterns of use. This is due in part to the relatively short period of time for intensive use of the technology in other than demonstration projects. The 1988 Office of Technology Assessment (OTA, 1988) report, Power On! New Tools for Teaching and Learning, states: "Little research exists that specifically addresses K-12 distance education, and what does exist is limited in scope and often anecdotal (p. 45)." Other researchers (Eiserman & Williams, 1987) have found it necessary to draw on research at the higher education level in order to develop information on effectiveness and practice of distance education.

The Office of Technology Assessment's 1989 report, Linking for Learning (OTA, 1989, p. 97), cites summary findings of research that found that students were "consistently more successful" in distance education classes where facilitators encouraged students and learned and participated with them in the course.

Facilitator's Role

While receive-site facilitators for satellite distance education are not the primary teacher, they are in the classroom with the students, and they fulfill the face-to-face contact role that the distance teacher cannot always fulfill due to time or distance. This team relationship between facilitator and distance teacher makes it necessary to give consideration to how the facilitator uses technology at the receive-site to help accomplish the instructional objectives of the distance teacher and the organization providing the course. Facilitators have two types of opportunities to impact student achievement. One type of opportunity is that of serving as a role model for the use of technology

as a tool for learning. The other opportunity is that of motivating the student to succeed and monitoring student activity and interaction with the course content and the distance teacher.

Regular exchanges of information and a team approach are emphasized by distance education course providers. Facilitator responsibilities (TI-IN, 1989, p. 7; OTA, 1989, p.97), include:

1. Attending training sessions
2. Monitoring equipment operation
   a. Demonstrating proper use of equipment
   b. Reporting technical difficulties
   c. Recording courses for replay
3. Supporting instruction
   a. Disseminating and returning course materials
   b. Monitoring and facilitating instruction
   c. Keeping records
   d. Consulting with the distance teacher
   e. Administering evaluations
   f. Assisting with educational activities as assigned by the distance teacher

Facilitator's Importance to Learning

It is important to know what impact facilitators may have on student learning in a distance education course. Three considerations are of central importance:

1. The distance education system must operate successfully if learning is to take place (technical operation).
2. The facilitator acts to focus the student's attention on the distance teacher and the course content. The smoother the operation, the less interference in learning (utilization methods).
3. The technology, itself, may serve as an organizer for student learning. Smoother operation contributes to better organization of content by the students (combination of technical operation and utilization methods).

Methods

The research undertaken in this study was designed to develop and pilot the use of a model suitable for examining the effectiveness of various aspects of a distance education delivery system. The receive-site facilitator was chosen as the aspect or system component to study.

Study Questions

The relationship of specific facilitator knowledge and practices to student achievement was examined by asking these questions:

Study Question 1

What is the relationship of a receive-site facilitator's knowledge of the satellite telecommunications delivery system, as indicated by a knowledge test and self-report inventory, to student achievement, as measured by the final semester grade (numerical range of 68-99), for a satellite delivered course?

Study Question 2

What is the relationship of a receive-site distance education facilitator's practices for enhancing student interaction with the distance teacher and the course content in satellite delivered instruction, as indicated by a self-report inventory of practices, and student achievement, as measured by the final semester grade, for a satellite delivered course?

Study Question 3

Is there an interaction between a receive-site facilitator's knowledge of the satellite telecommunications delivery system and the facilitator's practices for enhancing student interaction with the distance teacher and the course content in satellite delivered instruction which relates to student achievement in a satellite delivered course?

Research Model

In proposing possible research areas for the use of new technologies in education, Clark and Salomon (1986, p. 474) suggest that researchers avoid looking for differences in how well a technology enables teaching. They state: "Any new technology is likely to teach better than its predecessor because it generally provides better prepared instructional materials and its novelty engages learners (p. 474)."

Clark and Salomon suggest inquiry into a medium's impact on the environment into which it is introduced. Inquiries into the impact of a technological medium of instruction may address changes in the way resources are allocated, changes in how providers and users interact, and changes in the structure of organizations. Two aspects of this type of problem are of interest: 1) how innovations naturally influence the educational setting and its attendant resources , and 2) how these innovations can be directed in order to achieve desirable outcomes.

Coldeway (1988) stated that "The components that directly impact learners are of particular interest to many involved in distance education, especially components that may impact learning, achievement, motivation, rates of study, errors, communications, etc. (p. 50)." First stage component research, which analyzes a component for existence and level of quality, is a prerequisite for understanding how the components of a system may affect learning; subsequent research may manipulate the component in order to study changes in the effect (Coldeway, 1988, p. 51).

[PLEASE PLACE TABLE 1 ABOUT HERE]

Transactional distance, or the relative relationship of "dialog" and "structure" in an educational endeavor, can be used as a measure of the degree of separation between teacher and learner. Moore (1983, p. 157) defines dialogue as "...the extent to which, in any educational programme [sic], learner and educator are able to respond to each other." Educational programs can be judged more or less distant on the basis of the level of dialogue [sic] between learner and teacher. Moore defines structure as "...a measure of an educational programme's [sic] responsiveness to learners' individual needs." More distant programs have a higher structure and are less responsive to an individual learner's needs. This relationship is shown in Figure 1.

[PLEASE PLACE FIGURE 1 ABOUT HERE]

Content, educational philosophy, learner and educational personalities, the learning environment, and the communications medium determine the nature of the dialog. Structure includes educational objectives, teaching strategies, and evaluation methods. Flexibility in the preparation and application of objectives, strategies, and evaluation indicates less structure (Moore, 1983, p. 157).

The use of media in distance education provides a means of changing the level of dialogue and structure. Media can be used to optimize interaction between the learner and the teacher by providing a balance between dialogue and structure (Saba, 1988, p. 17).

An organizational model for satellite delivery systems in education, proposed by Vest (1975), has provided a framework for studying the facilitator's role in secondary education. In this system, the facilitator can be viewed as part of the classroom subsystem in the larger satellite telecommunications delivery system for secondary level distance education. Vest (1975 pp. 253-266) described a system for organizing and coordinating a complex satellite educational delivery system. The system contained nine subsystems. The subsystems and the relationships among them are shown in Figure 2. A facilitator for a distance education class may be considered to be a component of the classroom subsystem in Vest's model.

[PLEASE PLACE FIGURE 2 ABOUT HERE]

The model for this study, then, is first stage component research which inquires about the impact of a component in a subsystem of the larger system of satellite-delivered instruction by examining the existence and level of quality of what receive-site facilitators do to assist students with distance education and its relationship to student achievement.

Design

An unbalanced 2 x 2 factorial design was used to analyze data for the Study Questions. The design provided for analyzing four different combinations of facilitator attributes: 1) High Practices/High Knowledge (HH), 2) High Practices/Low Knowledge (HL), 3) Low Practices/High Knowledge (LH), and 4) Low Practices/Low Knowledge (LL). Total N for facilitators was ten, but the Ns for the groups were unbalanced; and, therefore, a regression model was used for the analysis.

Both independent facilitator variables, facilitator knowledge of the satellite telecommunications delivery system and facilitator practices, were assigned to high and low groups around a median. Scores above the median are high scores; scores below the median are low scores. The dependent variable was the site mean for student's final semester grade. The unbalanced 2 x 2 factorial design is illustrated in Figure 3.

[PLEASE PLACE FIGURE 3 ABOUT HERE]

Subject Selection

Students enrolled in a satellite distance education French language course during the Fall Semester, 1989, and their facilitators were asked to participate in the study. Twenty-seven receive-site classes, with 111 students, were available for the study. In order for a site to be included in the study, the facilitator for the site had to agree to be included in the study. Thirty-four students (31 %) from ten sites and their facilitators (ten; 37%) responded to the invitation to participate in the study.

Typically, students enrolled in distance education courses are screened by guidance counselors or principals for ability to do advanced work. Of the thirty-four students (31%) who responded to this survey, 13 (38%) were male and 21 (62%) were female. The average student respondent for this French I distance education course was 16 years of age, in a school grade with 84 students, and enrolled in a receive-site class of seven students.

The facilitators for the distance education course used in this study were either teachers appointed to be facilitators or aides hired to be facilitators. The facilitators in the study were not required to be certified in the subject area of the satellite course.

Contact with Subjects

Researcher contact with both students and facilitators took place through written communication which accompanied the data collection instruments. Data collection instruments for both facilitators and students were distributed by the satellite system administrator through their normal administrative channels for the French language course. All data instruments were collected as a package at each receive-site and returned to the researcher through the satellite system administrative channels. The researcher was

available by telephone to answer questions from facilitators, students, parents or guardians, or the satellite system administrator; however, no contact, except for administrative liaison through satellite system personnel, was made with the researcher by subjects or the distance teacher.

Both facilitator and student background data were collected at the beginning of the Spring (2nd) Semester 1990. Student data collection was performed by the receive-site facilitator in conjunction with the satellite system administration. Facilitator data collection was performed by the satellite system administration through administrative channels used for communication with site facilitators. These channels included surface mail, telephone calls, and announcements by the distance teacher over the satellite television system.

Collection of Student Data

A survey questionnaire form was used to collect student background data. The researcher-designed student background survey was reviewed for consistency and readability by a panel consisting of teachers and administrators familiar with the expected age group range of the students. The panel included secondary level distance education site facilitators, a state department of education administrator with responsibility for distance education, a high school level writing teacher, and a higher education reading researcher. The survey instrument used in the study incorporates suggestions made by the review panel for improving consistency, readability, and relevancy of the instrument for the student population available to the researcher.

Student achievement in the course was determined by assignment of a final grade for the semester (Fall Semester 1989) preceding data collection. The final semester grade for students was given by the course provider in accordance with the normal procedure they observe for testing students in a distance education course. Assigned grades ranged from 68 to 99. The semester ran from August 30, 1989 to January 12, 1990. Semester grades (68 to 99) were based on equal weights for each of the six weeks grading periods and the semester examination. Six weeks grades were based on major tests and homework assignments with major tests receiving more weight. The student's first six weeks grade, final examination score, and semester grade were obtained from satellite system administrative records.

Collection of Facilitator Data

Facilitator data collection instruments included: 1) a background survey form and 2) a knowledge test and self-report inventory for the satellite telecommunications delivery system, and 3) a self-report inventory of practices for facilitating satellite courses.

Facilitator data collection instruments were researcher-designed based on lists of duties for site facilitators, issues identified

in the review of literature for the study, and discussions with researchers and practitioners in distance education. The instruments were reviewed by means of a modified one-round Delphi procedure by a panel consisting of an industry training manager, higher education researchers, K-12 and state department level administrators, and secondary level distance education site facilitators. Comments and suggestions for revision were closely aligned, and one round was determined to be sufficient for the instrument review.

Data analyses for the study included:

For facilitator data (N=10):

1. Relationship of facilitator knowledge, as indicated by the score on the satellite telecommunications delivery system test, to student group achievement in the course, as measured by the final course grade.
2. Relationship of facilitator practices, as indicated by the score on the practices inventory, to student group achievement in the course, as measured by the final course grade.
3. Interaction of facilitator knowledge and practices with student group achievement, as measured by the final course grade.

For student data (N=34):

4. Differences of final grades among student groups across sites.
5. Description of which variables, including facilitator qualifications, are most predictive of final grade for students.

Satellite Telecommunications Delivery System Knowledge Test

The knowledge test was an assessment of the facilitator's knowledge about management and operation of the satellite telecommunications delivery system. Questions on this test measured facilitator knowledge in two areas: 1) general knowledge about satellite systems and 2) general operation knowledge about classroom receive-site equipment.

Facilitator Practices Self-Report Inventory

This inventory measured facilitator practices related to enhancement of the students' interaction with the distance teacher and the course content. The inventory was constructed from a list of duties for facilitators. It includes knowledge items and frequency of occurrence items.

Results

Data analysis was accomplished with the aid of FASTAT™: Fast Statistics for the Macintosh (Ver. 1) statistical analysis software running on a Macintosh IIx microcomputer and SYSTAT©: The

System for Statistics (Ver. 3.0) software running on an IBM PS/2 Model 50 microcomputer.

Findings Related to Study Questions

Neither Knowledge Category nor Practices Category nor their interaction had a significant relationship with Semester Grade which had a mean of 88.206 and a standard deviation of 7.804. The combination of Knowledge Category and Practices Category and their interaction accounts for only 9.7% of the variance in semester grades across sites as indicated by the value for Squared Multiple R for this regression. The data indicate that the probability of the Knowledge Category contribution to Semester Grade being due to chance could be .865 and that the probability of the Practices Category contribution to the relationship being due to chance could be .983. This analysis is located in Table 2.

[PLEASE PLACE TABLE 2 ABOUT HERE]

Subsidiary Findings

The Stepwise regression procedure in SYSTAT (Ver 3.0) was used to develop a model for predicting student achievement. The procedure started with factors with a high correlation with Semester Grade, and it produced the model in Table 3. This model accounted for 87.1% of the variance in Semester Grade ($F=15.767$, $p \leq .000$). The data indicated that the combination of Six Weeks Grade (ability indicator), Availability of Printed Handouts(scale = 1-5), and Facilitator Encouragement(scale = 1-5),and Site (each contrasted to Site 1) had a relationship with Semester Grade.

When the first six weeks grade is used a covariate with semester grade, the combination of the availability of print handouts when they are being discussed, how much the students feel the facilitator encourages activities which help with learning material presented in the course, and site has a significant relationship (a=.05) with semester grade .

The problem with this model is that Site, which is an undefined factor) is one of the factors and that Print Handout has a negative influence. Intuitively, learning aids would be expected to enhance learning. The data regarding availability of printed handouts in this study is confounded because of conflicting reports concerning this factor. It is also possible that the large percentage of sites missing handouts has resulted in homogeneous data which does not have enough variance to allow a finding of the real impact of printed handouts. Site differences could not be accounted for with the data available.

[PLEASE PLACE TABLE 3 ABOUT HERE]

This model uses the six weeks grade as a factor in student ability, the degree of facilitator encouragement, the availability of

handouts, and the differences in sites to account for 87.1% of the variance in Semester Grade across sites. Sites 2 through 7 are different from Site 1. Inspection of the data did not reveal reasons for the similarities in contribution to Semester Grade for students being at Sites 3, 4, and 5 or the similarities in contribution to Semester Grade for being at Sites 6 and 7.

Implications

This study was limited to a French language satellite-delivered distance education course in secondary schools. The model for the study was limited to one course provided through a single satellite system. The study assumed that the learner was not in direct control of the delivery system and that the distance teacher was not in direct, continuous interaction with the student. The study also assumed that the contribution of the distance teacher, who has primary responsibility for student learning, to student achievement balanced out across the study.

The analyses for relationship of facilitator knowledge and practices with student achievement did not reveal a significant relationship between student achievement for either the knowledge category or the practices category or their interaction. It is possible that what facilitators know about the satellite delivery system and their practices for enhancing student interaction with the distance teacher and the course content do not have a relationship with student achievement. Alternatively, a relationship, which the instruments used with the population in this study failed to find, may exist. It is possible that a different test with different items may find a relationship between facilitator attributes and student achievement.

It is possible also that a test alone may not reveal a relationship between facilitator attributes and student achievement. This may, in fact, be the case because the data indicated (Table 3) that a combination of factors are the best indicators of student achievement and differences in sites.

Recommendations

There are many possibilities for further research into facilitators' relationships to student achievement. This study could be repeated with a larger sample. Because this study had a relatively small sample of students and facilitators to work with, there is the possibility that the data were homogeneous and did not have differences that were detectable.

Other researchers may want to consider replicating the study across content areas and across course providers. In either or both cases, further studies should consider employing a means of comparing student achievement to standardized norms in order to determine the relative effectiveness of the distance education programs.

Recommendations for improving the data collection are: to include measures of the learning styles and aptitudes of students, to include more measures of things effective teachers do, and to include qualitative observation of students and facilitators. It also may be useful to include some measures of the difference in recall of information presented through audio and video modes. Researchers conducting research similar to this study may wish to collect data in separate categories for when students view video recordings for review and when they view recordings to make up lessons. Separating these two categories and asking if printed handouts were available when the distance teacher talked about the material may eliminate the confusion about the importance of printed handouts encountered by this study.

Qualitative research may be the best methodology for determining what facilitators and students actually do in distance classes. This type of research may provide valuable insight into what facilitators know about facilitating and how they facilitate student interaction with the distance teacher and the course content. It may also provide information about other factors which influence student achievement.

Follow-up studies that track students' ability to do college-level work in the subject areas in which they took distance courses may provide information about the effectiveness of distance education as a system for providing pre-college and advanced placement courses.

Further research of the type conducted in this study may be most useful if it can point to better ways that the course provider, distance teacher, and facilitators can work together as a team. Due to the complexity of conducting research in a consortium environment, researchers may wish to consider contractual arrangements for working with course providers and satellite system administrators to conduct research into delivery of instruction by satellite.

References

Clark, R. E., & Salomon, G. (1986). Media in teaching. In M. C. Wittrock (Ed.), Handbook of research on teaching (3rd. ed.) (pp. 464-478). New York: MacMillian.

Coldeway, D. O. (1988). Methodological issues in distance education research, The American Journal of Distance Education Research, 2(3), 45-54.

Eiserman, W. D. & Williams, D. D. (1987). Statewide evaluation report on productivity project studies related to improved use of technology to extend educational programs. Sub-report two: Distance education in elementary and secondary schools. A review of literature. Logan, UT: Wasatch Institute for Research and Evaluation [for Utah State office of Education; presented at the Annual Meeting of the American Educational Research Association, New Orleans, LA, April 23-27, 1984]. (ERIC Document Reproduction Service No. ED 291 350)

Grayson, L. P. (1974). Educational satellites: The ATS-6 experiments. Journal of Educational Technology Systems, 3(2), 89-123.

Holmberg, B. (1986). Growth and structure of distance education. London: Croom Helm.

Moore, M. (1983). The individual adult learner. In M. Tight (Ed.), Education for Adults: Vol. 1. Adult Learning and Education, pp. 153-168. London: Croom Helm.

Saba, F. (1988). Integrated telecommunications systems and instructional transaction. The American Journal of Distance Education, 2(3), 17-24.

TI-IN Network. (1989) TI-IN United STAR Network Operational Guidelines for Direct Student Instruction and Staff Development. San Antonio, TX: TI-IN Network.

U. S. Congress, Office of Technology Assessment. (1988). Power on! New tools for teaching and learning (OTA Publication No. OTA-SET-379). Washington, DC: U. S. Government Printing Office.

U. S. Congress, Office of Technology Assessment. (1989). Linking for learning: A new course for education (OTA Publication No. OTA-SET-430). Washington, DC: U. S. Government Printing Office.

Vest, C. R. (1975). The educational satellite: A systems model. Journal of Educational Technology Systems, 3(4), 249-266.

Tables

Table 1: Conceptual Framework for Distance Education Research

Input Variables	Process Variables	Outcome Variables
Student •Educational background •Perceived needs •Motivation •Learning styles •Study environment	**Development** •Curriculum development model •Design of instruction •Media •Course workload •Pacing •Production procedures	**Student** •Enrollment •Academic progress •Academic performance •Use of materials and services •Dropout
System •National requirements •Institutional policy •Financial resources •Technological resources •Human resources •Geography	**Delivery** •Recruitment methods •Academic support •Formal feedback	**System** •Development efficiency •Cost •Effectiveness •Acceptance in the system

Note. From "Methodological Issues in Distance Education Research" by D. O. Coldeway, 1988, The American Journal of Distance Education, 2, p. 52. Copyright 1988 by The American Journal of Distance Education. Adapted by permission.

Table 2: Regression of Semester Grade on Knowledge Category and Practices Category

Dep var: SEM_GD N=10 Multiple R : 311 Squared Multiple R: .097
Adjusted Squared Multiple R .000 Standard Error of Estimate: 8.666

Variable	Coefficient	Std. Error	Std. Coef	Tolerance	T	P (2 tail)
Constant	83.540	37.773	0.000	.	2.212	0.069
KNOW_CAT	3.84	21.664	0.271	0.0640000	0.177	0.865
PRAC_CAT	-0.478	21.664	-0.034	0.0640000	-0.022	0.983
KNOW_CAT x PRAC_CAT	0.437	13.702	0.043	0.0816327	0.032	0.976

Analysis of Variance

Source	Sum-of-Squares	DF	Mean-Square	F-Ratio	P
Regression	48.162	3	16.054	0.214	0.883
Residual	450.564	6	75.094		

Case D is an outlier. (Studentized residual = -3.352

Table 3: Regression of Semester Grade on Six Weeks Grade, Site Number, Print Hand Out Availability, and Facilitator Encouragement

Dep var: SEM_GD N=31 Multiple R : 8933 Squared Multiple R: .871
Adjusted Squared Multiple R .816 Standard Error of Estimate: 3.409

Variable	Coefficient	Std. Error	Std. Coef	Tolerance	T	P (2 tail)
Constant	-0.364	10.101	0.000	1.0000000	-0.036	0.972
Sx. W. Gd.	0.589	0.121	0.521	.5375250	4.877	0.000*
Prt. HO	-3.857	1.529	-0.893	.0490236	-2.523	0.020*
Fac. Enco.	4.965	1.563	0.390	.4072758	3.176	0.005*
SITE2	15.059	2.694	0.875	.2507826	5.590	0.000*
SITE3	26.128	6.428	1.321	.0581407	4.065	0.001*
SITE4	27.783	6.133	1.404	.0638530	4.530	0.000*
SITE5	25.647	4.717	0.806	.2792216	5.437	0.000*
SITE6	34.608	6.384	1.485	.0818683	5.421	0.000*
SITE7	33.735	6.916	1.060	.1298824	4.878	0.000*

Analysis of Variance

Source	Sum-of-Squares	DF	Mean-Square	F-Ratio	P
Regression	1649.333	9	183.259	15.767	0.000*
Residual	244.087	21	11.623		

*p≤.05

Figures

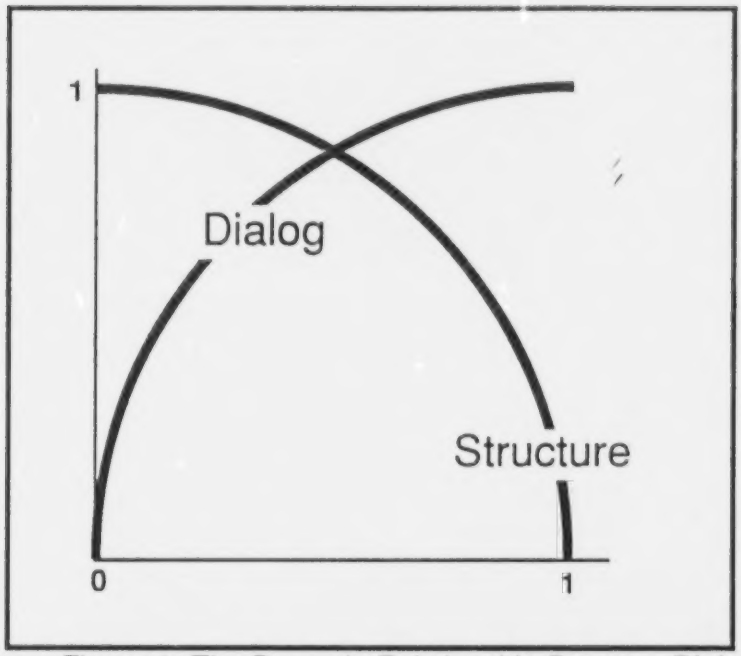

Figure 1. The Dynamic Relationship Between Dialog and Structure

Note. From "Integrated telecommunications Systems and Instructional Transaction" by F. Saba, 1988, The American Journal of Distance Education, 2, p. 23. Copyright 1982 by The American Journal of Distance Education. Used by permission.

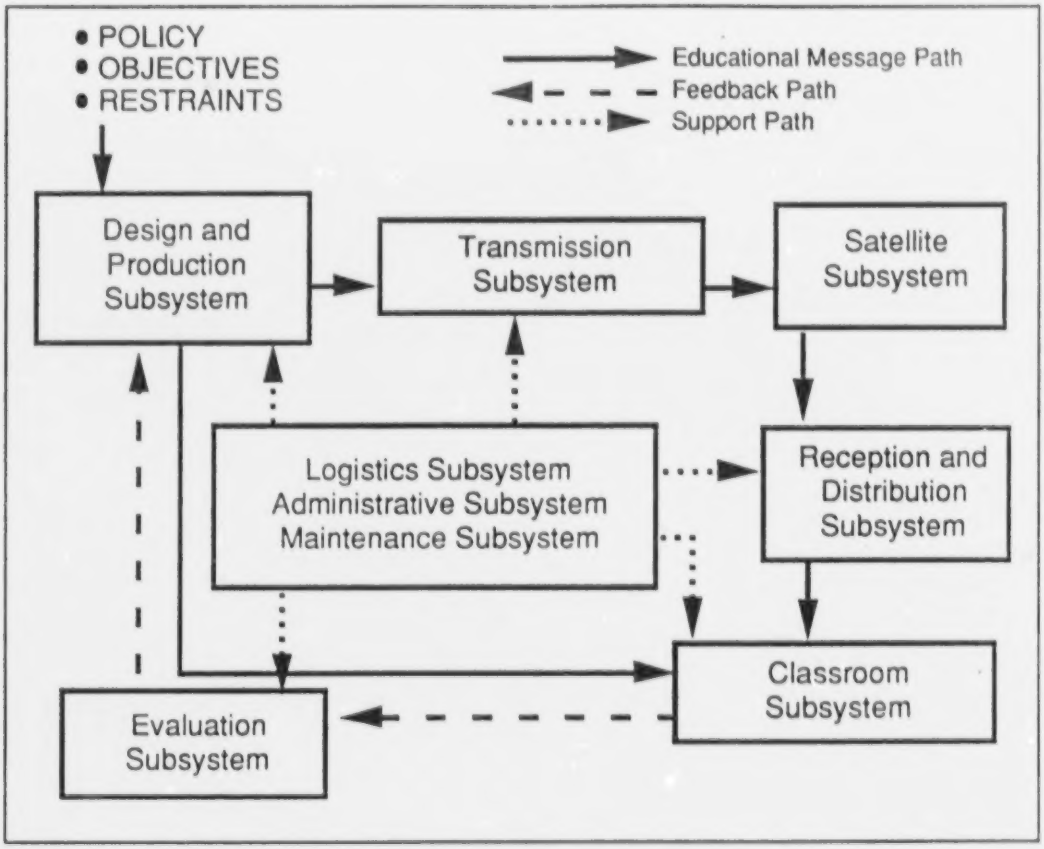

Figure 2. The Educational Satellite Systems Model. Note. From "The education Satellite: A Systems Model" by C. R. Vest, 1975, Journal of Educational Technology Systems, 3, p. 254. Copyright 1975 by Baywood Publishing Co. Adapted by permission.

	Knowledge	
Practices	High	Low
High	HH	HL
Low	LH	LL

Figure 3. Design for Analysis of Variance for for Unequal Groups: Receive-Site Facilitator Knowledge and Practices Relationship to Student Achievement